SEALEVEL
SYSTEMS INCORPORATED

SeaPORT+4/485™

Part # 2402

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Table of Contents

INTRODUCTION 1
OVERVIEW 1
WHAT'S INCLUDED 1
INSTALLATION INSTRUCTIONS 2
WINDOWS 98/ME/2000/XP/VISTA™ OPERATING SYSTEMS 2
PHYSICAL INSTALLATION 3
CONFIGURATION 5
ORIGINAL CONFIGURATION 5
ELECTRICAL INTERFACE SELECTION 5
SWITCH EXAMPLES 7
TECHNICAL DESCRIPTION 8
FEATURES 8
CONNECTOR PIN ASSIGNMENTS 8
RS-422/485 (DB 9 Male) 8
SPECIFICATIONS 9
APPENDIX A - TROUBLESHOOTING 10
APPENDIX B - HOW TO GET ASSISTANCE 11
APPENDIX C - ELECTRICAL INTERFACE 12
APPENDIX D - ASYNCHRONOUS COMMUNICATIONS 13
APPENDIX E - COMPLIANCE NOTICES 14
WARRANTY 16

Figures:

Figure 1: Switches SW2 and SW4 6
Figure 2: RS422/485 Interface Configuration 7
Figure 3: Asynchronous Bit Diagram 13

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Introduction

Overview

The Sealevel Systems **SeaPORT+4/485** equips the PC with 4 USB to RS-422/485 Asynchronous serial ports providing a versatile interface for common serial needs. The advantage of this product over more traditional approaches is that it does not require opening the computer case, nor does it require resources such as I/O ports or IRQ's. It does require a system that supports USB both in terms of hardware and operating system.

What's Included

The **SeaPORT+4/485** is shipped with the following items. If any of these items is missing or damaged, contact the supplier.

- **SeaPORT+4/485** USB to RS-422/485 Serial I/O Adapter
- USB Cable Part Number CA179 for Connecting to Upstream Host/Hub
- Sealevel Software

Installation Instructions

Windows 98/ME/2000/XP/Vista™ Operating Systems

Do not connect the device to a USB port until the software is installed.

1. Start Windows.
2. Insert the Sealevel Software CD in to your CD drive.
3. If 'Auto-Start' is enabled the installation window will automatically appear. Otherwise, navigate to the root directory of your CD drive and double-click the 'autorun.exe' application to launch the installation window.
4. Select 'Install Software'.
5. Select the Part Number for your device from the listing.
6. The setup file will automatically detect the operating environment and install the proper components. Follow the information presented on the installation screens that follow.
7. A screen may appear with the declaration: "The publisher cannot be determined due to the problems below: Authenticode signature not found." Please select the 'Yes' button and proceed with the installation. This declaration simply means that the Operating System is not aware of the driver being loaded. It will not cause any harm to your system.
8. During setup, you may specify installation directories and other preferred configurations. This program also adds entries to the system registry that are necessary for specifying the operating parameters for each driver. An uninstall option is included to remove the driver and all registry/INI file entries from your system.
9. Proceed with the physical installation of your SeaLINK USB serial adapter.

NOTE:

Windows NT is not USB aware and thus cannot support this device.

Physical Installation

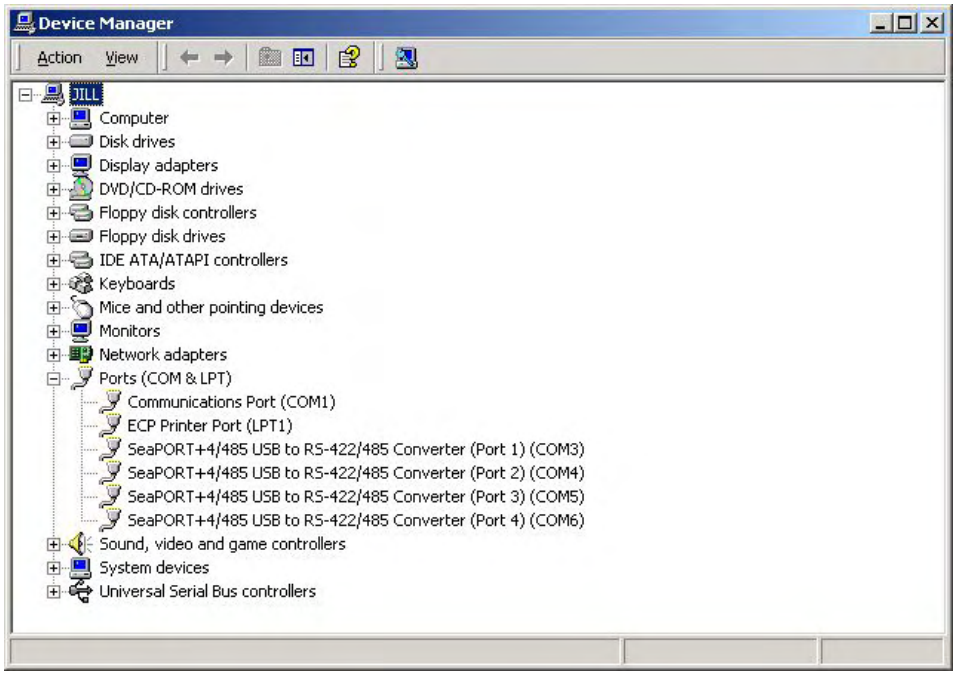
The screen captures below are taken from a Windows 98 installation. Your particular operating system may differ slightly from what is shown based on your version of Windows.

The **SeaPORT+4/485** can be connected to any upstream type "A" port either at the PC host or an upstream hub. The **SeaPORT+4/485** is hot pluggable, meaning there is no need to power down your computer prior to installation.

Connect the **SeaPORT+4/485** to an upstream host or hub.

The **New Hardware Found** wizard will now proceed to locate the appropriate drivers. These drivers were installed during the SeaCOM software setup procedure. Once the drivers are found a new window will pop up indicating the installation of each of the four new ports.

If you view the system's Device Manager, you should have new "COM" ports in the Ports (COM & LPT) Device Class. This is shown on the following page.



You can access your new COM: ports by using the assigned COM: identifiers as shown above. In this case, it is COM3, 4, 5 and 6. However, this assignment will vary from system to system. At this point, the hardware is recognized and ready to use.

Configuration

Original configuration

This device ships from Sealevel Systems with the following configuration.
422 mode,
120 ohm termination,
1K ohm pull up on RX+
1K ohm pull down on RX-

In order to change this configuration the box must be opened. Do this by removing the four screws located on the bottom. When reassembling please note that the top and bottom are keyed to fit in only one direction.

Electrical Interface Selection

Each of the four ports on the **SeaPORT+4/485** can be individually configured as an RS-422 or RS-485 interface. This is selectable via the DIP switches and DIP shunts. Each of the switch positions is described on the following page.

Switch Descriptions

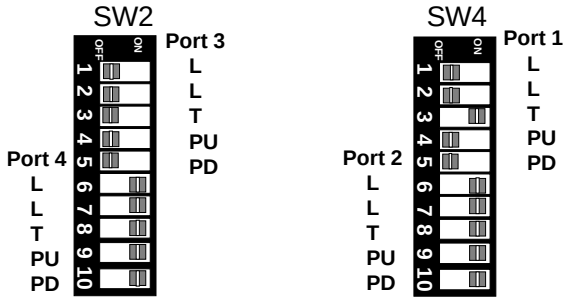


Figure 1: Switches SW2 and SW4

L 485 option, OFF for 422.
OFF: No effect
ON : Connects TX+ to RX+ for two-wire operation

L 485 option, OFF for 422.
OFF: No effect
ON : Connects TX- to RX- for two-wire operation

PU 485 option, OFF for 422.
OFF: No effect
ON : Adds a 1 K ohm pull-up resistor to RX+

PD 485 option, OFF for 422.
OFF: No effect
ON : Adds a 1 K ohm pull-down resistor to RX-

T 422 and 485 option.
OFF: No effect
ON : Adds a 120 ohm termination resistor between RX+ and RX-

Switch Examples

Figure 2: RS422/485 Interface Configuration

485 Mode Selection

OFF : 422 Mode
The transmitter lines TX+ and TX- are always driven

ON : 485 Mode
The transmitter lines TX+ and TX- are switched to high impedance when the device is not actively transmitting data

NE 485 option, OFF for 422

OFF : The receiver is always enabled. In a two-wire setup the receiver will echo back all transmitted data.

ON : The receiver is disabled when the transmitter is enabled. In a two-wire setup the receiver will not echo back transmitted data.

Note: Switch positions 1 and 2 are for port 1 and switch positions 3 and 4 for port 2 on SW3. Switch positions 1 and 2 are for port 3 and switch positions 3 and 4 for port 4 on SW1.

Technical Description

The **SeaPORT+4/485** utilizes four USB UARTs. These chips feature programmable baud rate, data format, 128 byte Dual Port TX Buffer, and 384 byte Dual Port RX Buffer. The RS-422/485 transceiver supports data rates up to 921.6K baud.

Features

- Hot pluggable device that does not require opening the case
- No system resources are required (i.e. I/O ports or IRQ's)
- LED status indicators for USB Enabled and port activity

Connector Pin Assignments

RS-422/485 (DB 9 Male)

Signal	Name	Pin #	Mode
GND	Ground	5	
TX +	Transmit Data Positive	4	Output
TX-	Transmit Data Negative	3	Output
RTS+	Request To Send Positive	6	Output
RTS-	Request To Send Negative	7	Output
RX+	Receive Data Positive	1	Input
RX-	Receive Data Negative	2	Input
CTS+	Clear To Send Positive	9	Input
CTS-	Clear To Send Negative	8	Input

Specifications

Environmental Specifications

Specification	Operating	Storage
Temperature Range	0º to 50º C (32º to 122º F)	-20º to 70º C (-4º to 158º F)
Humidity Range	10 to 90% R.H. Non-Condensing	10 to 90% R.H. Non-Condensing

Manufacturing

- All Sealevel Systems Printed Circuit boards are built to UL 94V0 rating and are 100% electrically tested. These printed circuit boards are solder mask over bare copper or solder mask over tin nickel.

Power Consumption

This device is a high power USB device. It must be plugged into the USB root hub or a self powered hub capable of supplying 500 mA per port.

Mean Time Between Failures (MTBF)

Greater than 150,000 hours. (Calculated)

Physical Dimensions

Package Length	7.06 inches	(17.93 cm)
Package Width	5.32 inches	(13.51 cm)
Package Height	1.50 inches	(3.81 cm)

Appendix A - Troubleshooting

Serial Utility test software is supplied with the Sealevel Systems adapter and will be used in the troubleshooting procedures. Using this software and following these simple steps, most common problems can be eliminated without the need to call Technical Support.

1. If your adapter isn't working, first check to make sure that USB support is enabled in the System BIOS and it is functioning properly in the operating system. This can be done by using either the Windows 98/ME or Windows 2000 Device Manager.

2. Ensure that the Sealevel Systems software has been installed on the machine so that the necessary files are in place to complete the installation.

3. When the **SeaPORT+4/485** is configured properly, the USB Enabled LED (E) will be lit. This should allow you to use Sealevel's WinSSD utility and the supplied loopback plug to check communications. The supplied loopback plug connects TD to RD. If you decide to test the Modem Control Signals, a full pin loopback plug will be required. Details on loopback plugs are included on WinSSD. Contact Sealevel Systems if you need further assistance

4. When testing the **SeaPORT+4/485** in loopback mode, you should see the port LED's flashing as well as seeing echoed data on the screen. The loopback test first transmits a HEX pattern, 55AA, and then a ASCII string of data. If this test passes, then the **SeaPORT+4/485** is ready for use in your application.

5. Please note that if the adapter is configured for 2 wire RS-485 with no echo a loopback test is not possible. The receiver in this case will be turned off and the test will fail. If you plan on using this device in two wire mode test the adapter in RS-422 mode first. Then configure the adapter for your application.

Appendix B - How To Get Assistance

Please refer to
Appendix A - Troubleshooting prior to calling Technical Support.

1. Read this manual thoroughly before attempting to install the adapter in your system.
2. When calling for technical assistance, please have your user manual and current adapter settings. If possible, please have the adapter connected in a computer ready to run diagnostics.
3. Sealevel Systems maintains a home page on the Internet. Our home page address is www.sealevel.com. The latest software updates, and newest manuals are available via our FTP site that can be accessed from our home page.
4. Technical support is available Monday thru Friday from 8:00 a.m. to 5:00 p.m. Eastern time. Technical support can be reached at (864) 843-4343.

RETURN AUTHORIZATION MUST BE OBTAINED FROM SEALEVEL SYSTEMS BEFORE RETURNED MERCHANDISE WILL BE ACCEPTED. AUTHORIZATION CAN BE OBTAINED BY CALLING SEALEVEL SYSTEMS AND REQUESTING A RETURN MERCHANDISE AUTHORIZATION (RMA) NUMBER.

Appendix C - Electrical Interface

RS-422

The RS-422 specification defines the electrical characteristics of balanced voltage digital interface circuits. RS-422 is a differential interface that defines voltage levels and driver/receiver electrical specifications. On a differential interface, logic levels are defined by the difference in voltage between a pair of outputs or inputs. In contrast, a single ended interface, for example RS-232, defines the logic levels as the difference in voltage between a single signal and a common ground connection. Differential interfaces are typically more immune to noise or voltage spikes that may occur on the communication lines. Differential interfaces also have greater drive capabilities that allow for longer cable lengths. RS-422 is rated up to 10 Megabits per second and can have cabling 4000 feet long. RS-422 also defines driver and receiver electrical characteristics that will allow 1 driver and up to 32 receivers on the line at once. RS-422 signal levels range from 0 to +5 volts. RS-422 does not define a physical connector.

RS-485

RS-485 is backwardly compatible with RS-422; however, it is optimized for partyline or multi-drop applications. The output of the RS-422/485 driver is capable of being **Active** (enabled) or **Tri-State** (disabled). This capability allows multiple ports to be connected in a multi-drop bus and selectively polled. RS-485 allows cable lengths up to 4000 feet and data rates up to 10 Megabits per second. The signal levels for RS-485 are the same as those defined by RS-422. RS-485 has electrical characteristics that allow for 32 drivers and 32 receivers to be connected to one line. This interface is ideal for multi-drop or network environments. RS-485 tri-state driver (not dual-state) will allow the electrical presence of the driver to be removed from the line. Only one driver may be active at a time and the other driver(s) must be tri-stated. RS-485 can be cabled in two ways, two wire and four wire mode. Two wire mode does not allow for full duplex communication and requires that data be transferred in only one direction at a time. For half-duplex operation, the two transmit pins should be connected to the two receive pins (Tx+ to Rx+ and Tx- to Rx-). Four wire mode allows full duplex data transfers. RS-485 does not define a connector pin-out or a set of modem control signals. RS-485 does not define a physical connector.

Appendix D - Asynchronous Communications

Serial data communications implies that individual bits of a character are transmitted consecutively to a receiver that assembles the bits back into a character. Data rate, error checking, handshaking, and character framing (start/stop bits) are pre-defined and must correspond at both the transmitting and receiving ends.

Asynchronous communications is the standard means of serial data communication for PC compatibles and PS/2 computers. The original PC was equipped with a communication or COM: port that was designed around an 8250 Universal Asynchronous Receiver Transmitter (UART). This device allows asynchronous serial data to be transferred through a simple and straightforward programming interface. Character boundaries for asynchronous communications are defined by a starting bit followed by a pre-defined number of data bits (5, 6, 7, or 8). The end of the character is defined by the transmission of a pre-defined number of stop bits (usually 1, 1.5 or 2). An extra bit used for error detection is often appended before the stop bits.

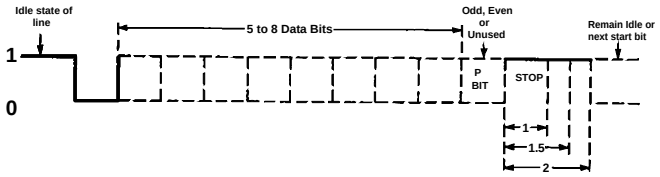


Figure 3: Asynchronous Bit Diagram

This special bit is called the parity bit. Parity is a simple method of determining if a data bit has been lost or corrupted during transmission. There are several methods for implementing a parity check to guard against data corruption. Common methods are called (E)ven Parity or (O)dd Parity. Sometimes parity is not used to detect errors on the data stream. This is refereed to as (N)o parity. Because each bit in asynchronous communications is sent consecutively, it is easy to generalize asynchronous communications by stating that each character is wrapped (framed) by pre-defined bits to mark the beginning and end of the serial transmission of the character. The data rate and communication parameters for asynchronous communications have to be the same at both the transmitting and receiving ends. The communication parameters are baud rate, parity, number of data bits per character, and stop bits (i.e. 9600,N,8,1).

Appendix E - Compliance Notices

Federal Communications Commission Statement

This equipment has been tested and found to comply with the limits for Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

Caution

Sealevel Systems, Inc. is not responsible for any radio or television interference caused by unauthorized modifications of this equipment or the substitution of attachment of connecting cables and equipment other than those specified by Sealevel Systems. Such unauthorized modifications, substitutions, or attachments may void the user's authority to operate the equipment. The correction of interference caused by such unauthorized modifications, substitutions, or attachments will be the responsibility of the user.

Always use cabling provided with this product if possible. If no cable is provided or if an alternate cable is required, use high quality shielded cabling to maintain compliance with FCC directives.

Canadian Radio Interference Regulations

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet Appareil numérique de la classe B respecte toutes les exigences de Règlement sur le matériel du Canada

EMC Directive Statement

Products bearing the CE Label fulfill the requirements of the EMC directive (89/336/EEC) and of the low-voltage directive (73/23/EEC) issued by the European Commission.

To obey these directives, the following European standards must be met:

EN55022 Class B - 'Limits and methods of measurement of radio interference characteristics of information technology equipment'

EN55024-'Information technology equipment Immunity characteristics Limits and methods of measurement.

EN60950 (IEC950) - 'Safety of information technology equipment, including electrical business equipment'

Always use cabling provided with this product if possible. If no cable is provided or if an alternate cable is required, use high quality shielded cabling to maintain compliance with EMC directives.

Warranty

Sealevel Systems, Inc. provides a lifetime warranty for this product. Should this product fail to be in good working order at any time during this period, Sealevel Systems will, at it's option, replace or repair it at no additional charge except as set forth in the following terms. This warranty does not apply to products damaged by misuse, modifications, accident or disaster.

Sealevel Systems assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, or inability to use this product. Sealevel Systems will not be liable for any claim made by any other related party.

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